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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/804,004	03/12/2001	Marcel Eduard Irene Broekaart	NL 000314	8862
24737	7590	05/04/2004	EXAMINER	
PHILIPS INTELLECTUAL PROPERTY & STANDARDS			HA, NATHAN W	
P.O. BOX 3001			ART UNIT	
BRIARCLIFF MANOR, NY 10510			PAPER NUMBER	
			2814	

DATE MAILED: 05/04/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application N .

09/804,004

Applicant(s)

BROEKAART ET AL.

Examiner

Nathan W. Ha

Art Unit

2814

RW

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 February 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 3-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 3-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1, 3-5, 9, and 12 are rejected under 35 U.S.C. 102(e) as being anticipated by Avanzino et al. (US 6,593,632, previously cited, hereinafter Avanzino.)

In regard to claim 1, in figs. 1-2b, Ngo discloses a method of manufacturing an electronic device comprising steps of:

applying a semiconductor substrate 12 (fig.1) which is provided with a conductor 16 at the surface, the conductor having a top surface portion and sidewall portions (not numbered) at least the top surface portion is provided with an etch stop layer 21 comprising silicon carbide, see the abstract;

applying a dielectric layer 19, see col. 4, lines 15-18;

etching a via in the dielectric layer over the conductor, see fig. 1, and stopping on the etch stop layer to creating exposed part of the etch stop layer, see fig. 1;

removing the exposed part of the etch stop layer inside the via from at least the top surface portion of the conductor, see fig. 1; and

filling the via with conductive material 11, see fig. 1 and col. 4, lines 25-27,

wherein the etch stop layer is applied to the top surface portion and the sidewall portions of the conductor after the provision of the conductor at the surface of the semiconductor substrate.

In regard to claim 3, see fig. 1.

In regard to claim 4, the etch stop layer is removed from inside the via from only the top surface portion of the conductor, see fig. 1.

In regard to claim 5, see fig. 1.

In regard to claim 9, see the abstract, where in the dielectric constant is less than 3.2.

3. Claims 13-14 are rejected under 35 U.S.C. 102(e) as being anticipated by Wolstenholme, US 6,649,968, newly cited.

In regard to claim 13, in fig.9, Wolstenholme discloses a method of forming electrically conductive pathways, comprising:

forming a patterned conductor 23 on a substrate 11, the patterned conductor having sidewalls 42 and a top surface, the patterned conductor further having an electrically conductive capping layer disposed on the top surface thereof, the capping layer having a top surface and sidewalls;

forming a conformal etch stop layer 46 such that the etch stop layer is in contact with at least the substrate, the sidewalls of the patterned conductor, and the top surface and sidewalls of the capping layer;

forming a dielectric layer 48 over the etch stop layer;

forming a via opening in the dielectric layer, the via opening exposing a portion of the etch stop layer, the via opening at least partially overlapping the at least one patterned conductor;

anisotropically etching the exposed portion of the etch stop layer such that at least a portion of the capping layer is exposed. See col. 8, lines 1-2; and

filling the via opening with electrically conductive material.

In regard to claim 14, wherein the via opening is unlanded, and wherein the electrically conductive material in the via opening is spaced away from the patterned conductor sidewalls and the capping layer sidewalls by the etch stop layer adjacent the sidewalls of the patterned conductor and the sidewalls of the capping layer. See figs. 7-9.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 7-8 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Avanzino as applied to claim 1-5, 9, and 12 above, and further in view of Boeck et al. (US 5,880,018, previously cited, hereinafter Boeck.)

In regard to claims 7-8, Avanzino discloses all of the claimed limitations as mentioned above, except the layer 160 being a capping layer and made of titanium nitride, for example.

Boeck, as previously mentioned, discloses an analogous device with further capping layer 64 disposed immediately on top of the conductor layer 55 and this capping layer is made of titanium nitride in order to prevent diffusion from the above layer, see fig. 15 and col. 7, lines 40-54.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to substitute layer 160 of Avanzino with capping layer 64 as taught by Boeck in order to obtain the advantage mentioned above.

In regard to claim 10, it is noted that the method of making dielectric layer by depositing materials such as hydrogen silsesquioxane, parylene and fluorinated polyimide is widely use to deposit low -K dielectrics since the thickness of the layer can be easily control by using this method.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to apply the well known method as taught by Boeck in Avanzino in order to obtain the advantage mentioned above.

6. Claims 6 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Avanzino as applied to claims 1-5, 9, and 12 above, and further in view of Ngo et al. (US 6,190,966, newly cited, hereinafter, Ngo.)

In regard to claims 5 and 11, Avanzino discloses all of the claimed limitations as mentioned above except that the conductive layer is being made of tungsten.

Ngo, in fig. 10, discloses an analogous device including substrate 12, conductive layer 14e, and etch stop layer 20 and a conductive layer in the via made of tungsten in order to provide better access to the regions below, for example, gate, source and drain.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to apply the well known metal as taught by Ngo in Avanzino in order to provide better access to the regions below, for example, gate, source and drain since tungsten has high conductivity constant.

7. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wolstenholm as applied to claims 13-14 above, and further in view of Avanzino et al., cited above.

In regard to claim 15, Wolstenholme discloses all of the claimed limitations as mentioned above except the stop layer contains silicon carbide. Avanzino discloses an analogous semiconductor device as mentioned above and further teaches the stop layer contains SiC to take advantage of low dielectric constant, less than 3.2.

Therefore, it would have been obvious to one of ordinary skilled in the art at the time of the invention was made to apply the well known dielectric layer as taught by Avanzino in order to take advantage of low dielectric constant.

8. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wolstenholme and Avanzino as applied to claim 15 above, and further in view of above-mentioned Boeck, US 5,880,018.

In regard to claim 16, see discussions above, regarding claims 7-8.

Response to Arguments

9. Applicant's arguments with respect to claims 1 and 3-11 have been considered but are moot in view of the new ground(s) of rejection. For instance, Applicants submit that the cited art does not teach applying etch stop layer to the conductor sidewalls. It is noted that the feature upon which applicant relies is not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Conclusion

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nathan W. Ha whose telephone number is (703) 305-3507. The examiner can normally be reached on M-TH 8:00-7:00(EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (703) 308-4918. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and 308-3432 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Nathan Ha
May 1, 2004



LONG PHAM
PRIMARY EXAMINER